# MATERIAL SAFETY DATA SHEET

## 1. SUBSTANCE AND SOURCE IDENTIFICATION

**National Institute of Standards and Technology**
**Standard Reference Materials Program**
**100 Bureau Drive, Stop 2300**
**Gaithersburg, Maryland 20899-2300**

**SRM Number: 2203**
**MSDS Number: 2203**
**SRM Name: Potassium Fluoride (Standard for Ion-Selective Electrodes)**

**Date of Issue: 18 August 2006**

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**Description:** This Standard Reference Material (SRM) is intended for use in the standardization of fluoride ion-selective electrodes. Each unit of SRM 2203 consists of 125 g of analytical reagent-grade potassium fluoride, which may contain traces of chloride, fluosilicates and heavy metals.

**Substance:** **Potassium Fluoride**

**Other Designations:** **Potassium Fluoride** (potassium fluoride crystal; potassium monofluoride; clocat F.)

## 2. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS[1]

| | |
|---|---|
| **Component:** | **Potassium Fluoride** |
| **CAS Number:** | 7789-23-3 |
| **EC Number (EINECS):** | 232-151-5 |
| **SRM Nominal Concentration (mass %):** | 99.5 |
| **EC Classification:** | T (Toxic) |
| **EC Risk (R No.):** | R23 (toxic by inhalation)<br>R24 (toxic in contact with skin)<br>R25 (toxic if swallowed)<br>R47 (may cause birth defects) |
| **EC Safety (S No.):** | S1 (keep locked up)<br>S26 (in case of eye contact, rinse immediately and seek medical advice)<br>S46 (if swallowed, seek medical advice immediately, show container or label) |

[1] Hazardous components 1 % or greater; Carcinogens 0.1 % or greater are listed in compliance with OSHA 29 CFR 1910.1200.

## 3. HAZARDS IDENTIFICATION

**NFPA Ratings (Scale 0–4):** Health = 3 Fire = 0 Reactivity = 1

**Major Health Hazards:** Damages mucous membranes, kidneys, skeleton; depletes calcium.

**Potential Health Effects**
**Inhalation:** Severe irritation and burns to respiratory tract.

**Skin Contact:** Severe irritation and burns to skin and mucous membranes; may be absorbed.

**Eye Contact:** Causes severe irritation and burns; possible eye damage.

**Ingestion:** Gastrointestinal pain and upset; tremors, convulsions, coma, and death may follow; chronic exposure may damage bones.

**Listed as a Carcinogen/ Potential Carcinogen:** **Potassium Fluoride**

| Yes | No | |
|---|---|---|
| | X | In the National Toxicology Program (NTP) Report on Carcinogens. |
| | X | In the International Agency for Research on Cancer (IARC) Monographs. |
| | X | By the Occupational Safety and Health Administration (OSHA). |

## 4. FIRST AID MEASURES

**Inhalation:** If adverse effects occur, remove to uncontaminated area. If not breathing, give oxygen or artificial respiration by qualified personnel. Seek medical attention if breathing is difficult or if irritation persists.

**Skin Contact:** Rinse affected area with copious amounts of water for at least 15 minutes while removing contaminated clothing. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

**Eye Contact:** Flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Seek medical attention at once, and bring the container or label.

**Ingestion:** Get immediate medical attention or contact poison control center immediately if possible. DO NOT induce vomiting. If vomiting occurs, keep head lower than hips to prevent aspiration. Seek medical aid immediately and bring the container or label.

## 5. FIRE FIGHTING MEASURES

**Fire and Explosion Hazards:** Potassium Fluoride is a negligible fire hazard.

**Extinguishing Media:** Water spray will reduce irritant gases released by surrounding fire. Regular dry chemical. Regular foam. Carbon dioxide.

**Fire Fighting:** Avoid inhalation of material or combustion by-products. Wear full protective clothing and NIOSH-approved self-contained breathing apparatus (SCBA).

**Flash Point:** Not available.
**Method Used:** Not available.

**Autoignition Temp.:** Not available.

**Flammability Limits in Air**
**UPPER (Volume %):** Not available.
**LOWER (Volume %):** Not available.

**Hazardous Decomposition:** May produce hydrogen fluoride vapors and oxides of potassium.

## 6. ACCIDENTAL RELEASE MEASURES

**Occupational Release:** Isolate the spill area and warn people not to touch the material. Cleanup personnel must wear eye protection, respirator, and protective clothing. Refer to Section 8, "Exposure Controls and Personal Protection." Vacuum or sweep up spilled material and place in a suitable container for reclamation or disposal, using a method that does not generate dust. Provide ventilation.

**Disposal:** Refer to Section 13, "Disposal Considerations".

## 7. HANDLING AND STORAGE

**Storage:** Store in tightly closed original container in a cool, dry, well-ventilated area. Protect from physical damage. Isolate from acids and alkalis. Observe all warnings and precautions when handling empty Potassium Fluoride containers, which may retain hazardous product residues.

**Safe Handling Precautions:** Wear eye protection, protective clothing, and respirator or use local or general exhaust (Section 8). Wash thoroughly after handling and before eating. Wash contaminated clothing before re-use. See Section 8, "Exposure Controls and Personal Protection".

## 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

**Exposure Limits:** **Potassium Fluoride:**
OSHA (PEL): 2.5 mg/$m^3$ TWA
ACGIH: 2.5 mg/$m^3$ TWA
NIOSH: 2.5 mg/$m^3$ recommended TWA (10 h)
WEL UK: 2.5 mg/$m^3$ TWA

**Ventilation:** Use local or general exhaust to keep employee exposures below limits. Local exhaust ventilation is preferred because it can control contaminant emissions at the source, preventing dispersion into the general work area. Refer to the ACGIH document, *Industrial Ventilation, a Manual of Recommended Practices*.

**Respirator:** If necessary, refer to the "NIOSH Guide to the Selection and Use of Particulate Respirators Certified under 42 CFR 84" for selection and use of respirators certified by NIOSH.

**Eye Protection:** Use chemical safety goggles or a full face shield where dusting or splashing of solutions may occur. The employer should provide an emergency eye wash fountain and safety shower in the immediate work area.

**Personal Protection:** Wear impervious protective clothing, including boots, gloves, lab coat, apron, or coveralls, as necessary to prevent skin contact. Pregnant women should avoid contact with this material due to the risk of fetal damage.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| **Component:** | **Potassium Fluoride** |
| **Appearance:** | White crystals or powder. Odorless. |
| **Relative Molecular Mass:** | 58.10 |
| **Molecular Formula:** | KF |
| **Density:** | 2.48 g/$cm^3$ |
| **Boiling Point:** | 1505 °C (2741 °F) @ 101.325 kPa (1 atm) |
| **Melting Point:** | 858°C (1576°F) |
| **Vapor Density (Air = 1):** | 2.0 |
| **Water Solubility:** | High (92.3 % at 18 °C) |
| **Solvent Solubility:** | Soluble in hydrogen fluoride. Insoluble in alcohol. |

## 10. STABILITY AND REACTIVITY

**Stability:** __X__ Stable _____ Unstable

Stable at normal temperatures and pressure.

**Conditions to Avoid:** Moisture (can attract moisture from air). Avoid contact with incompatible material.

**Incompatible Materials:** Platinum plus bromine trifluoride. Reacts with acids (including stomach acid) to form hydrogen fluoride. Also incompatible with strong oxidizers, metals, corrosives, quinine salts, and soluble calcium salts. Corrodes glass and porcelain.

**Fire/Explosion Information:** See Section 5, "Fire Fighting Measures". Noncombustible. Containers may explode when heated.

**Hazardous Decomposition:** Burning may produce hydrogen fluoride vapors and oxides of potassium.

**Hazardous Polymerization:** _____ Will Occur __X__ Will Not Occur

## 11. TOXICOLOGICAL INFORMATION

**Route of Entry:** X Inhalation X Skin X Ingestion

**Toxicity Data:** **Potassium Fluoride**
Rat, Oral: $LD_{50}$: 245 mg/kg
Rat, Intraperitoneal: $LD_{50}$: 64 mg/kg
Mouse, Intraperitoneal: $LD_{50}$: 40 mg/kg

**Tumorigenic, Reproductive, Mutagenic Data:** Potassium Fluoride has been investigated as a mutagenic and reproductive effector. May cross the placenta. May be excreted in breast milk.

**Target Organs:** Eyes, skin, mucous membranes, bones, and kidneys (see below). Effects may be delayed.

**Health Effects (Acute and Chronic):** See Section 3: "Hazards Identification" for potential health effects.

## 12. ECOLOGICAL INFORMATION

**Ecotoxicity Data:** $LC_{50}$, "fish" (species not given): 2.3 mg/L
48-hr $LC_{50}$ carp (*Cyprinus carpio*): 51 mg/kg by gavage (oral)
$EC_5$, protozoa (*Entosiphon sulcatum*): 101 mg/L

**Environmental Summary:** Limited environmental information is available regarding potassium fluoride. At a concentration of 20 000 µg/L, it has been used as a pesticide to kill blue-green algae (cyanobacteria) in streams.

## 13. DISPOSAL CONSIDERATIONS

**Waste Disposal:** Dispose in accordance with all applicable federal, state, and local regulations. Although Potassium Fluoride is not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and thus requires appropriate analysis to determine specific disposal requirements. Processing, use, or contamination of this product may change the waste management options.

## 14. TRANSPORTATION INFORMATION

**U.S. DOT and IATA:** Potassium Fluoride, solid; UN Number 1812; Hazard Class 6.1; Packing Group III; Packing Instructions 619.

## 15. REGULATORY INFORMATION

**U.S. Regulations:** CERCLA Sections 102a/103 (40 CFR 302.4): Not regulated.

SARA Title III Section 302 (40 CFR 355.30): Not regulated.

SARA Title III Section 304 (40 CFR 355.40): Not regulated.

SARA Title III Section 313 (40 CFR 372.65): Not regulated.

OSHA Process Safety (29 CFR 1910.119): Not regulated.

SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

| | |
|---|---|
| ACUTE: | Yes. |
| CHRONIC: | Yes. |
| FIRE: | No. |
| REACTIVE: | No. |
| SUDDEN RELEASE: | No. |

**State Regulations:** California Proposition 65: Not regulated.

**CANADIAN Regulations WHMIS Classification:** Not determined.

| | |
|---|---|
| **EUROPEAN Regulations** | See Section 2: "Composition and Information on Hazardous Ingredients". |
| **National Inventory Status** | |
| **U.S. Inventory (TSCA):** | Listed on inventory. |
| **TSCA 12(b) Export Notification:** | Not listed. |

## 16. OTHER INFORMATION


**Sources:** MDL Information Systems, Inc., MSDS *Potassium Fluoride*, 15 September 2005.

American Conference of Governmental Industrial Hygienists (ACGIH), *Industrial Ventilation: A Manual of Recommended Practice*, 24th edition, 2001.

Khalil AM, Chromosome aberrations in cultured rat bone marrow cells treated with inorganic fluorides. *Mutation Research* 1995 May; 343(1):67-74.

U.S. Environmental Protection Agency, ECOTOX database (aquatic data report for KF).

U.S. National Institute for Occupational Safety and Health, *NIOSH Pocket Guide to Chemical Hazards*, June 1990 edition. DHHS (NIOSH) Publication No. 90-117.